

TOOLING WITH HELICAL COILS FOR STRUCTURED SURFACE ARTICLES

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Abstract of the Disclosure

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Tool rolls and methods of using the tool rolls to manufacture articles with one or more structured surfaces are disclosed. The tool rolls include an outer surface that, when used in connection with materials of the proper viscosity or formability, can form a structured surface on an article. Because the tools are manufactured in roll-form, they can be advantageously used in continuous manufacturing processes. Alternatively, discrete articles may be processed using the tool rolls. The tool rolls are constructed of a cylindrical base roll and are wrapped with one or more continuous wires in a modified undulating helical pattern. The modified helical pattern results in the distance between the first wire and a reference plane transverse to the longitudinal axis of the base roll sequentially increasing and decreasing at least once when moving in one direction about a circumference of the base roll. The wires are used, in essence, to form a structured surface on the tool roll that is the negative of the structured surface to be formed on the articles processed using the tool roll. One or more of the wires wound around the base roll may include a plurality of voids formed therein that, when wound about the base roll, form a plurality of mold cavities on the outer surface of the tool roll. Alternatively, the helical pattern of one or more wound wires may be used to form a continuous helical structured surface, e.g., a helical groove or grooves.